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Inventor(s): SASA MASAHIKO
Applicant(s): FUJITSU LTD
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Abstract

PURPOSE: To enhance a quantum interference transistor of this design in quantum interference effect by a method wherein an off substrate whose surface deviates slightly from a (100) plane by an angle of a few degrees is used, and two kinds of semiconductors different from each other in width of forbidden band are grown atomic layer by atomic layer to form a modulation structure by the use of an atomic layer epitaxial method.

CONSTITUTION: By a molecular beam epitaxy method, Ga and As are made to alternately irradiate an off substrate 10 atomic layer by atomic layer to form a GaAs buffer layer 6. Then, and an N-type GaAs contact layer 41 is formed through the same method, and furthermore, and an N-type GaAs contact layer 41 is formed through the same method. Furthermore, only Al atoms are made to irradiate by 3/8 of an atomic layer and then As is made to irradiate as much as Al or more, whereby an AlAs stripe layer 2 which is in contact with a step 8 and whose width is 3/8 of a space between steps is formed. When Ga and As are made to irradiate by 2/8 of an atomic layer respectively and further more Al and As are made to irradiate by 3/8 of an atomic layer respectively the same as above, an AlAs stripe layer 2 is formed. The above process is repeated and Ga and Al are changed in irradiation dose, whereby a GaAs stripe layer 21 can be ramified into two paths.